

Selected Potential Liabilities in Environmental Engineering and Consulting Practice

Barney P. Popkin
Environmental, Water and Waste Management Consultant
bppopkin@yahoo.com
27 January 2015

Abstract

Potential liabilities are abundant in infrastructure projects through engineering consulting in the U.S. and abroad. These can be property and life-threatening, costly and time delaying. They may be to some extent avoided or minimized by proper pre-feasibility and feasibility studies, especially by trained and experienced professionals with stakeholder consultations, monitoring and evaluation, and corrective actions as needed. It's best to conduct and critically review well-planned comprehensive pre-feasibility and feasibility studies, and be cognizant of actual site conditions during construction, implementation, operations and maintenance (O&M), and monitoring and evaluation to take corrective actions as needed. In all cases, such planning, implementation and related activities should be performed by qualified individuals who have completed the training and education, attained appropriate knowledge and insights, and developed the skills and techniques to properly conduct and evaluate the activities, under the supervision of experienced master-level, senior professionals. This article presents over a dozen selected liabilities with preventive measures, remedial/corrective actions, and comments based on over 15 years in international and 20 years of U.S. engineering and infrastructure experience.

Introduction

Liabilities are abundant in infrastructure projects through engineering consulting in the U.S. and abroad. These can be property and life-threatening, costly and time delaying. They may be to some extent avoided or minimized by proper pre-feasibility and feasibility studies, especially by trained and experienced professionals with stakeholder consultations, monitoring and evaluation, and corrective actions as needed.

Selected Liabilities

There are several common and less common potential liabilities in environmental engineering and consulting practice. Table 1 below summarizes several with preventive measure and remedial or corrective action. It's best to conduct and critically review well-planned comprehensive pre-feasibility and feasibility studies, and be cognizant of actual site conditions during construction, implementation, O&M, and monitoring and evaluation to take corrective actions as needed. In all cases, such planning, implementation and related activities should be performed by qualified individuals who have completed the training and education, attained appropriate knowledge and insights, and developed the skills and techniques to properly conduct and evaluate the activities, under the supervision of experienced master-level, senior professionals.

In addition, site, laboratory and analysis staff should avoid discussing tangential issues or make flippant comments to owner/ operators, agency officials, media and others which may be inaccurately interpreted to mean approvals where none are warranted. In addition, notes, reports, discussions and presentations, should be free of jargon, misinterpreted symbols and terms, and litigious and misleading terms like "all," "always," "each," "every," etc. It is especially important to provide the assumptions and data supporting findings, conclusions and recommendations with appropriate limitations; for example, if a specific sampling, testing and analysis program is followed, the results should reference only that and avoid making global comments like "it is safe," rather than "the measured and detected presence of maximum contaminant concentrations by this program are within U.S. EPA drinking water standards for these constituents." Moreover, although it would be preferred to present results in deterministic terms which imply absolute certainty and impracticality, it is much

better to present results in terms of probability or statistical exceedance statements which imply uncertainty and reliability.

Table 1. Liabilities Issues

Liability Issue	Preventive Measure	Remedial/ Corrective Action	Comment
Inappropriate conclusions, statements, approvals	Avoid discussing tangential issues or make flippant comments; notes, reports, discussions and presentations should be free of jargon, misinterpreted symbols and terms, and litigious and misleading terms like "all," "always," "each," "every," etc.	Provide full and accurate, non-gratuitous explanations and take corrective actions as needed	Avoid generalities
Overstating results	Provide the assumptions and data supporting findings, conclusions and recommendations with appropriate limitations		For example, if a specific sampling, testing and analysis program is followed, the results should reference only that and avoid making global comments like "it is safe," rather than "the measured and detected presence of maximum contaminant concentrations by this program are within U.S. EPA drinking water standards for these constituents." Moreover, although it would be preferred to present results in deterministic terms which imply absolute certainty and impracticality, it is much better to present results in terms of probability or statistical exceedance statements which imply uncertainty and reliability.
Inappropriate design, technology, and O&M requirements	Conduct and critically review, well-planned comprehensive designs with appropriate technologies and O&M requirements	Identify the problems and take corrective actions and repairs	Especially problematic in lower technology and developing and transitioning countries where energy, water, wastewater, hazardous and medical and other wastes, and cadres of appropriately trained and retained construction and O&M personal and supervisors are unavailable
Recharge basin back-up; dam and/ or reservoir leaks	Conduct and critically review, well-planned comprehensive site, laboratory and analyses studies; properly design, install, inspect, and monitor and evaluate the recharge basin, dam and reservoir; assure infiltration and permeability tests are properly performed and analyzed	Identify cause and source of back-ups and leaks; check for sinkholes and subsurface erosion; widen/ deepen and scour basins; apply sealant and pressure flexible grouts; continue careful monitoring and evaluation	Improperly performed tests and analyses may lead to inappropriate site locations and design
Groundwater production well runs dry	Conduct and critically review, well-planned comprehensive site and analyses studies; properly design, space, locate, install, develop, test, and monitor and	Re-develop, re-deepen well; acidify and/ or fracture the well bore if needed; eliminate pumping well	Wells located, designed and operated without consideration of interferences and future conditions may lead to dry well

Liability Issue	Preventive Measure	Remedial/ Corrective Action	Comment
	evaluate the well	interference; improve groundwater recharge	
Cross-gradient groundwater contaminates site groundwater	Conduct and critically review, well-planned comprehensive property environmental assessment	Remediate as necessary; reduce "cross-gradient" inflows	Statically "cross-gradient" may become upgradient when site is in operations; groundwater flows change
Reported agency permits and legal actions are improperly reported	Cross check and ground truth reports and interviews for consistencies and inconsistencies	Re-do the audit/ assessment	Agencies may misfile, mishap, or misretrieve information and report improperly
Interviewees give inaccurate and misleading information	Cross check and ground truth reports and interviews for consistencies and inconsistencies	Re-do the audit/ assessment	Interviewees may provide information from hearsay or lack of actual knowledge
Chemical analysis results don't balance or are misleading	Screen and audit laboratories for certification and quality assurance/ control; verify field and laboratory procedures, spikes, duplicates and test methods	Re-do the sampling and analyses	There are many opportunities for bad assumptions, poor sampling, sample preservation, holding-times, QA/ QC, and testing, including mislabeling and misinterpreting results
Numerical modeling results are misleading	Conduct and critically review, well-planned comprehensive modeling exercises with good, robust inputs and reasonable assumptions, with validation and verification, and monitoring and evaluation	Re-do models with better inputs and more reasonable assumptions; recognize that model results are potential guidelines which may need safety and other adjustments	Modeling far exceeds the availability of appropriate data and contains numerous assumptions about past and future events, accuracies and precisions
Impoundment contaminants leak to groundwater	Assure impoundment is compacted and appropriately lined	Check for sinkholes and subsurface erosion; compact, seal, line and/or grout impoundment surface	Hastily constructed and unsupervised impoundments and containment walls may be sloppily or incompletely compacted, sealed, lined or grouted
Foundation sinks contrary to pre-construction geotechnical studies	Assure foundation design is adequate and based on statistically significant and representative samples and tests	Check for sinkholes and subsurface erosion; uplift structure; upgrade foundation	Beneficiary and stakeholder consultations may produce very useful information and insights to improve project design and implementation
Site routinely floods or settles	Conduct and critically review, well-planned comprehensive drainage, flood and settling analyses with beneficiary and stakeholder consultations	Improve drainage and flood management; uplift structure and upgrade foundation	
Environmental audit or assessment misses issues	Conduct and critically review, well-planned comprehensive audits and assessments with pre-work scoping sessions, and owner/ operator, public and agency consultations	Extend audit or assessment	

Conclusions and Recommendations

It's best to conduct and critically review well-planned comprehensive pre-feasibility and feasibility studies, and be cognizant of actual site conditions during construction, implementation, O&M, and monitoring and

evaluation to take corrective actions as needed. In all cases, such planning, implementation and related activities should be performed by qualified individuals who have completed the training and education, attained appropriate knowledge and insights, and developed the skills and techniques to properly conduct and evaluate the activities, under the supervision of experienced master-level, senior professionals.